

Claims

We claim:

- 1 1. A system for shaping a single curvature parabolic membrane, the system comprising:
2 a shaping rail;
3 a bending rail;
4 at least two rollers operably connecting the shaping rail and the bending rail, the rollers
5 being operable to alter a position of the shaping rail relative to the bending rail;
6 a compression adjustment bar operably connected to ends of the shaping rail to apply a
7 load to the shaping rail; and
8 a bending adjustment bar operably connected to ends of the bending rail to apply a
9 moment to the shaping rail through the at least two rollers.
- 1 2. The system according to claim 1, wherein the system is operable to form the shaping
2 rail into a substantially parabolic shape.
- 1 3. The system according to claim 1, wherein in a stowed configuration the bending rail is
2 parallel to the shaping rail and in a deployed configuration the bending rail is not parallel to the
3 shaping rail.
- 1 4. The system according to claim 3, wherein in the deployed configuration the shaping

2 rail has a substantially parabolic shape.

1 5. The system according to claim 1, wherein the rollers are fixed to the bending rail and
2 roll along the shaping rail as the position of the shaping rail relative to the bending rail is altered.

1 6. The system according to claim 5, wherein the two rollers are arranged spaced apart in
2 the vicinity of one end of the bending rail and the shaping rail.

1 7. The system according to claim 1, further comprising:
2 a hinge pin interconnecting the shaping rail and the bending rail and operable to permit
3 the shaping rail and the bending rail to rotate relative to each other.

1 8. The system according to claim 7, further comprising:
2 a third roller arranged spaced apart from and in the vicinity of the hinge pin and operable
3 to alter a position of the shaping rail relative to the bending rail.

1 9. The system according to claim 7, wherein the hinge pin is arranged in the vicinity of a
2 first end of the shaping rail and the bending rail and the two rollers are arranged in the vicinity of
3 a second end opposite the first end.

1 10. The system according to claim 1, further comprising:
2 an adjustment bar operably connected to ends of the bending rail to apply a load to the
3 shaping rail through the rollers.

1 11. The system according to claim 1, further comprising:
2 a pair of bending bar standoffs operably connecting the bending adjustment bar to the
3 bending rail.

1 12. The system according to claim 11, wherein each bending bar standoff is pivotably
2 connected to the bending adjustment bar.

1 13. The system according to claim 11, wherein a distance between each end of the
2 bending adjustment bar and the adjacent bending bar standoff is adjustable.

1 14. The system according to claim 13, further comprising:
2 a clevis operable to adjustably connect each end of the bending adjustment bar to a
3 bending bar standoff.

1 15. The system according to claim 14, further comprising:
2 a threaded connection on each end of the bending adjustment bar and on each clevis
3 operable to adjustably connect the bending adjustment bar to the bending bar standoffs.

1 16. A large single curvature parabolic membrane optic, comprising:
2 at least two membrane shapers, each shaper comprising a shaping rail, a bending rail, at
3 least two rollers operably connecting the shaping rail and the bending rail, the rollers being
4 operable to alter a position of the shaping rail relative to the bending rail, and a bending

adjustment bar operably connected to ends of the bending rail to apply a load to the shaping rail through the rollers;

a compression adjustment bar operably connected to the shaping rail to apply corrective compressive loads and moments to the shaping rail; and

an optical membrane stretched between the at least two membrane shapers.

17. A system for shaping a single curvature parabolic membrane, the system comprising:
a shaping rail having a first end and a second end, the first end and the second end of the shaping rail being operably connected to each other such that the ends of the shaping rail may be brought closer together through application of a bending moment and in-line compression.

18. The system according to claim 17, further comprising:
a bending rail;
at least two rollers operably connecting the shaping rail and the bending rail, the rollers being operable to alter a position of the shaping rail relative to the bending rail; and
a bending adjustment bar operably connected to ends of the bending rail to apply a load to the shaping rail through the rollers.

19. A method for shaping a single curvature membrane optic, the method comprising:
generating curvature in a shaping rail by applying a load and a moment in the vicinity of a first end and a second end of the shaping rail; and
stretching an optical membrane between at least two shaping rails.

1 20. The method according to claim 19, wherein the curvature is parabolic.

1 21. The method according to claim 18, wherein applying the load to the shaping rail

2 comprises:

3 drawing the first end and the second end of the shaping rail toward each other and

4 drawing the shaping rail against at least two rollers fixed to a bending rail operably connected to

5 the shaping rail.

1 22. The method according to claim 21, further comprising:

2 drawing the shaping rail against at least two rollers fixed to a bending rail operably

3 connected to the shaping rail.

1 23. The method according to claim 22, further comprising:

2 altering a position of a least one roller to adjust a moment applied to the shaping rail.

1 24. The method according to claim 21, wherein drawing the first end and the second end

2 of the shaping rail toward each other comprises:

3 drawing toward the first end and second end of the shaping bar ends of an adjustment bar

4 operably connected to the first end and the second end of the shaping bar.

1 25. The method according to claim 21, wherein drawing the first end and the second end

2 of the shaping rail toward each other comprises:

3 drawing ends of an adjustment bar toward ends of bending bar standoffs operably

4 connecting the adjustment bar to the shaping bar.

1 26. The method according to claim 22, further comprising:

2 applying an in-line compression to the shaping rail.

1 27. The method according to claim 26, further comprising:

2 adjusting the in-line compression to produce an off-axis parabolic in the shaping rail.

1 28. The method according to claim 26, wherein applying an in-line compression to the
2 shaping rail comprises:

3 drawing the first end and the second end of the bending rail toward each other.

1 29. The method according to claim 22, further comprising:

2 altering a height of a compression bar standoff to modify the moment and a shear applied
3 at one end of the shaping rail.

1 30. The method according to claim 29, wherein the curvature generated is off-axis

2 parabolic.

1 31. The method according to claim 22, further comprising:

2 altering a distance between the at least two rollers to modify the moment and a shear
3 applied at one end of the shaping rail.

- 1 32. The method according to claim 31, wherein the curvature generated is off-axis
- 2 parabolic.